U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF THE

ACTING CHIEF OF THE DIVISION OF BIOLOGICAL SURVEY

FOR

1899.

BY

T. S. PALMER.

[From the Report of the Secretary of Agriculture.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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CONTENTS.

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U. S. Department of Agriculture,
Division of Biological Survey,
Washington, D. C., September 1, 1899.

Sir: I have the honor to submit herewith a report of the work of the Division of Biological Survey for the fiscal year ending June 30, 1899.

Respectfully,

T. S. Palmer,
Acting Chief.

Hon. James Wilson, *Secretary.*

WORK OF THE YEAR.

FIELD WORK.

During the fiscal year 1898–99 field work was carried on in four States, California, Maryland, Nevada, and Texas; in two Territories, New Mexico and Alaska; and also in Mexico, British Columbia, and the Northwest Territories. In the summer of 1898 the principal work was done in northern California, and in the spring of 1899 in Texas and Alaska. At the close of the field season of 1897 a biological reconnoissance of Washington and Oregon had been nearly completed, which, in addition to previous work in southern and southeastern California, covered fully two-thirds of the Pacific States, with the exception of an area in northern California. In 1898 attention was accordingly directed to this part of California, including the region surrounding Mount Shasta from the Madeline Plains west to the Pacific, and from the Oregon boundary south to Lassen Butte. Under the personal direction of Dr. C. Hart Merriam, camps were occupied on Mount Shasta from July 15 to October 3, 1898; the peak was completely encircled, the several life zones were outlined with great care, and data were secured regarding the distribution of the characteristic mammals, birds, and plants. Side trips were made to Lassen Peak, Little Shasta Valley, and westward to the coast at Humboldt Bay. Several "zone lines" were also run from the bottom of the Sacramento and San Joaquin valleys to the summit of the Sierra or beyond; one near Quincy (latitude 40°); one along the line of the Central Pacific Railroad (latitude 39°); and one to the Yosemite Valley (latitude 37° 30′). The results of the work on Mount Shasta will be published as North American Fauna No. 16. In the spring of 1899 supplementary collections were made in Hoopa Valley, at one or two points on Humboldt Bay, at Crescent City, in Shasta Valley, and in Modoc and Lassen counties, with a view to covering the entire northern part of California, and extending the biological reconnoissance southward.

The discovery of gold in the Klondike region and at several points in Alaska has aroused general interest in the resources of that Territory, and the rush of miners and emigrants to the new gold fields has brought about rapid development in the means of communication on the Upper Yukon. Regions heretofore practically inaccessible can now be explored with comparatively little difficulty, and it was therefore deemed advisable to begin systematic field work in Alaska during the summer of 1899. An unusually favorable opportunity was presented through the liberality of Mr. Edward H. Harriman, of New York, who extended an invitation to the Biological Survey to join an expedition he had fitted out at his own expense for a trip along the Alaska coast. Dr. C. Hart Merriam with two assistants accepted this invitation, and spent two months in active field work at numerous localities, most of which are out of the regular routes of travel. The steamer *George W. Elder*, fitted up with all necessary appliances for scientific work, was chartered especially for the trip and afforded unusual facilities for the collection and preparation of material. Leaving Seattle May 31, the party proceeded northward through the inside passage to Lynn Canal and Glacier Bay, stopping at several points to collect specimens and information and visiting Victoria, Wrangel, Juneau, and Skagway. Thence the steamer sailed by way of Sitka to Yakutat Bay, Prince William Sound, Cook Inlet, Kadiak Island, the Alaska Peninsula, Shumagin Islands, and Unalaska. After leaving Unalaska a northward course was followed into Bering Sea and several points of interest were visited, including the Pribilof Islands, Plover Bay, Port Clarence, and the islands of St. Lawrence, Hall, and St. Matthew. The return trip ended at Seattle on July 30.

In addition to this work on the Alaska coast, a party in charge of Mr. W. H. Osgood was detailed to work down the Yukon River. This party left Seattle about May 24, and upon reaching Skagway took the recently completed railway over White Pass and began work at the summit of the pass. By July 1 they had reached Tagish on the headwaters of the Yukon, and as the trip down the river is expected to occupy nearly three months, they will probably reach St. Michaels, at the mouth, about the end of September. The Upper Yukon is practically an unexplored field, and the systematic study of the fauna along its whole course ought to throw much light on the northern limits of the ranges of many species. The practically simultaneous exploration of the coast and the interior also promises to afford important data for mapping the life zones of southern Alaska, which will be useful to the experiment stations located in that region.

The work of tracing the life zones in Texas was continued during the spring and early summer of 1899. A party in charge of Mr. Vernon Bailey, chief field naturalist, ran several lines near the coast and made a trip northward from the Southern Pacific Railroad across the Staked Plains to Amarilla, west to the head of the Pecos Valley, New Mexico, and thence southward to the Texas border. Prof. William L. Bray, professor of botany at the University of Texas, accompanied the party as botanist and made collections which will be of much service in working up the field notes on the distribution of species in this region.

At the request of the State geological survey of Maryland some field work was carried on in Allegany and Garrett counties, in the western part of that State, with the object of outlining the life zones of Maryland in greater detail than had previously been done, and of ascertaining especially the area which the northern zones occupy in the mountains.

ECONOMIC RELATIONS OF BIRDS.

During the year 1,381 bird stomachs were received and 1,961 were examined in the laboratory. The stomachs examined may be grouped as follows:

Flycatchers	106	Robins	127
Blackbirds	590	Miscellaneous	113
Sparrows	820		
Swallows	50	Total	1,961
Chickadees	155		

The total number of bird stomachs in the collection on June 30, 1899, was about 31,300, representing the accumulation of fourteen years. Of these, only about 14,000, or less than 50 per cent, have been examined. Arranged according to groups, the stomachs already examined are distributed approximately as follows:

Hawks and owls	3,000	Shrikes	155
Cuckoos	155	Wrens and mockingbirds	400
Woodpeckers	675	Thrushes	535
Flycatchers	360	Miscellaneous	200
Crows and jays	1,300		
Blackbirds and orioles	3,520	Total	14,000
Sparrows	3,700		

Reports have been published on all of these groups except the flycatchers, blackbirds,[1] sparrows, and thrushes. Detailed reports on hawks and owls, the crow, woodpeckers, cuckoos, and shrikes were published in the form of special bulletins, while those on the blue jay, meadowlark, Baltimore oriole, crow blackbird, house wren, brown thrasher, and catbird were condensed and presented in popular form as articles in the Yearbooks for 1895–98. Most of these investigations, except those relating to hawks and owls, have also been summarized in Farmers' Bulletin No. 54.

Special efforts have been made to complete the examination of the stomachs of sparrows and blackbirds, and to prepare the results for publication. The number of stomachs available for the report on sparrows has now increased to about 4,000, comprising 20 species and several subspecies. Each of these species is represented by at least 50, and in some cases 300, stomachs—a sufficient number to furnish reliable data respecting the bird's food habits, and to determine its value as a weed destroyer.

It is proposed to supplement the brief papers on the food of the crow blackbird, meadowlark, and oriole, published several years ago, by a report on other members of the family, including the red-winged and yellow-headed blackbirds, Brewer's blackbird, the rusty grackle, cowbird, and bobolink. Much complaint is made of the depredations of the blackbirds which breed in enormous numbers in the swamps of the Upper Mississippi Valley and destroy considerable grain in the early autumn. The material now on hand shows definitely the damage done by each species, and also the members of the group which offset their grain-eating record by destruction of insects.

In addition to the examination of stomachs in the laboratory, considerable work has been done in the field to ascertain whether birds show marked preference in selecting food or simply eat that which is most abundant or most readily obtainable. Stomach examination shows what kind of food a bird has eaten, but it is desirable to know

[1] A brief paper on the crow blackbird, based on an examination of about 1,000 stomachs, was published in the Yearbook for 1894.

whether birds habitually reject other kinds of food, especially insects, which are equally abundant. In order to throw light on this question, Prof. F. E. L. Beal spent several weeks last summer in Massachusetts collecting bird stomachs and studying the available food supply in a limited area. Visits were also made to several places in New Hampshire and Vermont to learn what birds, if any, were injuring crops, more especially small fruits. Similar field work has also been carried on for practically two years at a point near Washington, D. C. A farm which is especially favorable for observation, both by reason of diversity of crops and abundance of birds, has been visited at intervals during the year, the crops noted, the birds observed, and a sufficient number of stomachs collected to show the character of the birds' food. Thus, it has been possible to determine definitely the effect of birds on the crops at each season.

PUBLICATIONS.

The past year has witnessed greater activity in publication than any previous period in the history of the Division. The publications include three bulletins (Nos. 9, 10, and 11); three numbers of North American Fauna (Nos. 14, 15,[1] and 16[1]); two articles in the Yearbook for 1898; the Report of the Division for 1898; reprints of Bulletins Nos. 10 and 11, North American Fauna Nos. 10, 12, and 13, and two reprints of Farmers' Bulletin No. 54 on "Some common birds in their relation to agriculture."

The three bulletins, No. 9 on "Cuckoos and shrikes," No. 10 on "Life zones and crop zones," and No. 11 on "Geographical distribution of cereals," have already been noticed in the report for last year. Two of these bulletins, Nos. 10 and 11, were in such demand that the editions were soon exhausted and reprints were rendered necessary within ten months after publication. The three numbers of North American Fauna are as follows: No. 14, "Report of the natural history of the Tres Marias Islands, Mexico," by E. W. Nelson; No. 15, a technical "Revision of the jumping mice of the genus *Zapus*," by Edward A. Preble; No. 16, "Report on a biological survey of Mount Shasta," by Dr. C. Hart Merriam, comprising an account of the field work done in northern California during the season of 1898. One of the articles in the Yearbook, entitled "Birds as weed destroyers," by Sylvester D. Judd, contained some preliminary results of the investigation on sparrows, showing the value of these birds in consuming weed seed during the winter. Another article, on "The danger of introducing noxious animals and birds," by T. S. Palmer, was prepared for the purpose of drawing attention to the folly of indiscriminate acclimatization of exotic birds and animals, as shown by the experience, both in the United States and in other countries, with the English sparrow, the mongoose, and similar pests.

The unusual number of reprints issued shows the demand for certain publications of the Division. This demand is particularly noticeable in the case of papers on food habits of birds and general reports on geographic distribution, such as the bulletin on "Life zones and crop zones."

GEOGRAPHIC DISTRIBUTION.

The compilation and tabulation of data for mapping geographic distribution of birds have continued practically without interruption

[1] Still in press.

during the year. Similar data have also been tabulated for mammals, as far as means were available. Progress in this work is necessarily slow, both on account of the great number of species and the necessity of keeping the maps already prepared up to date.

ROUTINE WORK.

Routine work necessarily continues to occupy much of the time of the office force. About 2,000 letters were received during the year, many of them accompanied by reports, schedules, and notes, which were examined and filed for future reference. Much of the correspondence relating to reports of the Division is easily disposed of, but inquiries concerning mammals and birds require special replies which often necessitate the expenditure of considerable time in preparation. About 1,700 letters were written, several hundred schedules distributed to correspondents and migration observers, and several hundred packages received and sent out. Other regular work consists in the arrangement of reports and information received from field naturalists and correspondents, preparation and examination of accounts, care of collections, unpacking and repacking specimens received for identification, forwarding supplies to field naturalists, bibliographic work, and preparation of reports and bulletins for publication. Much of this work, such as preparing manuscript for publication and proof reading, is now done by the chief of the Biological Survey and assistants, whose time could be better employed in scientific work or original investigations. Provision has therefore been made in the estimates for 1901 for an additional assistant who shall take charge of editorial and other routine work. This addition to the office force is greatly needed and will insure greater efficiency and economy in the work.

IDENTIFICATION OF SPECIMENS.

Many specimens have been received for identification, as in former years, but the fact that the Division is willing to identify specimens of mammals and birds, and that such material can be forwarded to the Department by mail and returned free of expense to the sender, does not seem to be as generally known as it should. The farmer or the fruit grower thus has an easy way of learning the name of an unfamiliar bird which is suspected of damaging his grain or fruit and the Department is informed of injuries to crops. Notwithstanding the time consumed in making the necessary examinations, correspondents are always encouraged to send in specimens concerning which they are in doubt, as such specimens often increase the value of accompanying notes and reports. Moreover, this work tends to stimulate observation and study of the habits of animals and birds, and thus has an educational value. Many persons forward long descriptions of birds which they wish to have named, but such descriptions are often vague and omit important details, so that it is impossible to tell with certainty to what species they refer. A specimen is always more satisfactory than a description. If a skin is not available, merely the head and wings are sufficient for identification in the case of a bird, and these can be inclosed in the envelope with the letter of inquiry.

ADDRESSES.

Applications are frequently received for the delivery of addresses by members of the Division before farmers' institutes, horticultural

societies, and game associations. The presentation of papers before such meetings may properly be considered a part of the duties of the office, but the time and labor involved in this form of educational work necessarily restrict it within narrow limits. Requests of this kind, however, are complied with whenever they do not involve expense or serious interruption of regular work. During the past year five addresses were given by assistants of the Division before horticultural societies and other organizations in three States and in the District of Columbia.

NATURE STUDY IN THE SCHOOLS.

The introduction of nature study in the common schools, and the efforts of the Audubon societies in the cause of bird protection, are responsible, in large measure, for the extraordinary popular interest in bird study which has developed in the past few years. Under the leadership of the College of Agriculture of Cornell University this novel kind of school work has made wonderful progress in New York, and has also been successfully taken up in other States. Children are so easily interested in birds that elementary ornithology has deservedly become one of the most popular branches of nature study, and its introduction into the lower grades of the public school opens a wide field for teaching the economic side of the subject as well as for correcting erroneous ideas now prevalent respecting the value of certain birds. One of the first suggestions for popularizing bird study was the observance of a Bird Day in the schools. Since this suggestion was indorsed by the Department in 1894, the observance of Bird Day in connection with Arbor Day has been provided for by law in at least three States—Wisconsin, Minnesota, and Connecticut—and has been adopted by many schools in other parts of the country.

The chief obstacle to the success of bird study in the schools is the lack of requisite knowledge on the part of teachers. Ornithology, unlike botany, chemistry, or entomology, is not usually included in high school or college courses, and teachers are obliged to rely mainly on their own efforts in acquiring a knowledge of the subject. That this obstacle is gradually being overcome, is shown by the enthusiasm with which the study is taken up by those who are required to teach it. It is said that 70,000 text books on birds have been sold by New York and Boston publishers during the last six years. During the same time probably more than 200,000 copies of circulars, separate papers, and reports on birds have been distributed by the Department of Agriculture, and demands for such literature are increasing so rapidly that it is impossible to meet all requests. Nearly every paper on economic ornithology ever issued by the Biological Survey is in demand by teachers for use in their work. Reports, fresh from the press, find their way into the schools and are almost immediately utilized in instruction. More than 20,000 copies of the circular on Bird Day have been distributed, and this leaflet has been reprinted by several of the Audubon societies, thus giving it still wider circulation. The Farmers' Bulletin on "Common birds in relation to agriculture," first issued in 1896, has been reprinted six times and is still in demand in spite of the 140,000 copies already published. Other reports no doubt would be equally popular if printed in large editions, but most of the publications are issued in too small editions to admit of such wide distribution. These figures speak for themselves. Through this channel the results of investigations of the Department reach a very

large number of people, and, what is still more important, the public is becoming interested in birds and is being educated to appreciate their value to agriculture.

BOUNTIES.

Measures designed for the suppression of injurious animals and birds have been considered during the past year by the legislatures of fully one-fourth of the States of the Union. In Connecticut an effort was made to restore the bounty on foxes; in Illinois, Indiana, Michigan, and Wisconsin sparrow bounties attracted attention, and in Illinois a bounty on crows was considered; wolves were the subject of bounty measures in Colorado, Minnesota, Montana, Utah, and Wyoming; the Texas legislature struggled with the problem of exterminating prairie dogs; while on the Pacific coast Washington considered the advisability of renewing ground-squirrel bounties.

An extended discussion of wolf bounties marked the annual convention of the National Live Stock Association, held at Denver early in January, 1899, and special consideration was given to the questions of the desirability of uniform bounty laws in all the Western States and Territories, of permanency in bounty legislation, and of rewards sufficiently large to be effective. In Colorado, Minnesota, Montana, and Wyoming attempts were made to secure new wolf-bounty laws or amend old laws; and in Utah to substitute a State bounty for existing county bounties.

In Illinois and Michigan movements were set on foot to secure the repeal of the acts under which rewards are now paid for the English sparrow. Indiana and Wisconsin on the other hand considered the advisability of offering bounties for this bird. Apparently all the sparrow bills failed to pass, so that bounties remain in force in Illinois and Michigan, but are still unprovided for in Indiana and Wisconsin. This will save the State of Wisconsin, according to the estimate of one of the Milwaukee papers, an annual expense of $30,000, although the proposed bounty was only 1 cent apiece for sparrows' heads and eggs.

In Texas certain stock raisers in the Panhandle proposed to exterminate prairie dogs by means of a bill requiring landowners to destroy all the dogs on their property on or before August 1, 1900, under a penalty not exceeding $100 for each section of land on which the animals were allowed to remain. Fortunately for nonresident landowners the bill failed to pass. The principle of this bill was practically the same as that of the ground-squirrel legislation of California of 1872–76, which not only failed to accomplish its purpose but proved extremely expensive to some of the counties.

In Washington a bill was introduced authorizing counties to levy a special tax for the payment of bounties on ground squirrels, and an effort was made, during its consideration, to render the payment of the rewards mandatory.

In several of these cases the Department was called upon for information and statistics regarding bounty laws and their results—an indication of the desire, as well as necessity, for a more general knowledge on this subject. A brief examination of the history of bounty legislation will show how useful such information would be in saving expensive experiments whose futility has already been demonstrated. Again and again measures are enacted which have already been tried in other States without any result except to entail needless expense.

The results of the mandatory clause in the Washington ground-squirrel bill and in the Texas prairie-dog bill could be easily foretold by reference to similar legislation in California, while the result of the high bounty on wolves now demanded in several Western States can be readily foreseen from past legislation in Montana and Colorado.

Bounty legislation in the United States dates back to 1630. During these two centuries and a half more than 400 separate laws have been passed containing every conceivable provision for securing proper enforcement, avoiding fraud, and raising funds with which to pay rewards. A brief compilation or summary of these various laws (including those that have been repealed as well as those still in force), with statistics showing the expenditures involved, would enable States to profit by past experience and perhaps avoid similar failures in future. Such a work has been undertaken by this office, with the object of presenting a comprehensive survey of bounty legislation, both in the United States and in foreign countries, so that those who are called upon to enact measures of this kind may ascertain beforehand the extent to which proposed laws are likely to be effective.

MOVEMENT AGAINST THE ENGLISH SPARROW IN BOSTON.

The English sparrow has attracted unusual attention during the year on account of the efforts made in Boston by the American Society of Bird Restorers to clear the sparrows from the Common and the Public Garden. A petition was presented to the mayor requesting that steps be taken, under authority of a law passed in 1890, to reduce the number of sparrows, by destroying the nests and eggs during the breeding season, on the plea that the bird had become a public nuisance. On March 15, five men in charge of a foreman began to tear down the nests in the trees and buildings on the Common, and to close up the holes which had been used as nesting sites, in order to prevent the nests from being replaced. The work proceeded without interruption until April 5, when it was suddenly brought to a close by order of the mayor. During the three weeks the work was carried on about 1,000 sparrow eggs and 4,000 nests were destroyed and 5,000 holes were closed. No birds were killed, but it was the intention of the society to trap the birds next winter and to destroy them by various other means, which should not involve putting out poison. A careful examination of the Common on May 14 revealed the presence of about 100 nests; on May 22, 152 nests were counted, and it was estimated that less than 450 birds were breeding there.

The nest destruction aroused a storm of opposition; numerous protests appeared in the daily papers, and many persons who perhaps had never before given the matter a thought suddenly became interested in sparrow extermination, and as a consequence hundreds of letters on the subject were received by the Department. Before the work had been under way a week the bulletin on the "English sparrow" (published by this Division in 1889 in a large edition, so that a considerable number of copies were still available for distribution) became entirely exhausted, and many requests for copies remained unfilled.

Unfortunately the experiment was not continued long enough to secure definite results or to test this method of preventing the undue increase of the bird. But the movement accomplished some good, not only in Boston but in other places in Massachusetts, as well as in other States, by attracting public attention to the difficulty of dealing with the sparrow question, and showing the extent to which an imported pest may increase under favorable circumstances.

PROPOSED INTRODUCTION OF THE "KOHLMEISE" AND "BLAUMEISE."

In the autumn of 1898 much interest was manifested in the Northwest in the so-called "Kohlmeise" or great titmouse of Europe. Horticulturists in Idaho advocated the introduction of this bird on the ground that it was valuable in Germany as a destroyer of the codling moth, and hence would be a desirable addition to the bird fauna of the United States. The suggestion seemed plausible, and soon attracted wide attention through the medium of the horticultural papers on the Pacific coast. Inquiries in regard to the bird and the advisability of its introduction were received by the Department from fruit growers in Idaho, Washington, and California. Investigation has failed thus far to substantiate the claims as to the bird's usefulness, and pending further information the introduction of this species has been discouraged

Later on it was suggested that the "Kohlmeise" was less valuable than the so-called "Blaumeise," and that in reality the latter bird was the one needed by orchardists. It is difficult to see what advantage would be gained by the acquisition of either species, as the Pacific coast already has several native titmice of the same genus. The "Kohlmeise," or great titmouse (*Parus major*), is a handsome bird, about the size of the common Eastern chickadee, but readily distinguished from any American titmouse by its markings. Like other titmice it is mainly insectivorous, but although German authors regard it as very useful, there seems to be no satisfactory evidence that it is partial to the codling moth, or in fact that it ever feeds on this insect to any great extent. On the other hand, in Great Britain, where it is a resident and generally distributed, it does not seem to hold the codling moth in check, but is accused of doing more or less damage to fruit, particularly pears and figs, and is even said to attack small and weakly birds.

The "Blaumeise" or blue titmouse (*Parus cæruleus*), is closely related to the "Kohlmeise" and is also a native of Europe. It feeds mainly on insects, and more, perhaps, can be said in its favor than in the case of the "Kohlmeise," but according to an eminent English ornithologist, even the blue titmouse "may perhaps damage fruit to a small extent" in autumn. Another English writer goes so far as to assert that during the fruit season the blue tit lives on scarcely anything else beside fruit, and is more destructive to it than all the other tits together.[1] The great danger in introducing exotic birds lies in the fact that species which are beneficial in their native haunts are likely to change their habits and become injurious in foreign lands. This fact was brought out in the paper on "The danger of introducing noxious animals and birds" in the Yearbook for 1898.

NECESSITY FOR LEGISLATION RESTRICTING INTRODUCTION OF NOXIOUS ANIMALS AND BIRDS.

Thirteen years ago attention was called to the necessity of restricting the indiscriminate importation of mammals and birds, and the recommendation was made that the introduction of exotic species should be placed under the control of the Department of Agriculture.[2] The necessity for some such action has become more apparent on account

[1] London Field, Vol. XCIV, p. 566, 1899.
[2] Ann. Rept. Dept. Agriculture for 1886, p. 258.

of the danger of introducing the mongoose into this country in consequence of the recent acquisition of Hawaii and Porto Rico and the resulting increase in the means of communication with these islands. The expedition dispatched last winter by the United States Fish Commission to Porto Rico discovered that the mongoose was not only present, but that it had spread all over the island, much as it spread over Jamaica. It was imported at San Juan about twenty years ago for the purpose of destroying rats in the cane fields, and is now regarded as a general nuisance by all except the sugar planters. In Hawaii it has long since ceased to be considered beneficial, and measures were adopted seven years ago to prevent its further increase. Although it is valuable as a destroyer of rats, its record in Jamaica shows that it is one of the worst pests that can be introduced into any country, as it does not confine its killing to small animals, but also destroys poultry, game, birds and reptiles, and even consumes some kinds of fruit. No greater calamity could befall the Southern States than the introduction of the mongoose, and no effort should be spared to prevent this animal from being brought into the United States.

Another foreign species which may perhaps prove troublesome is the European starling. This bird, liberated in Central Park, New York City, about 1877 and again in 1890, seems to have become firmly established, and is now gradually spreading up the Hudson Valley. It has also become established at Portland, Oreg., and a few individuals have been imported for the city park at Allegheny, Pa. It still remains to be seen whether the starling will become as great a pest here as it has in New Zealand, but the benefit of the acquisition of such a species is at best very doubtful.

The danger of introducing certain Old World mammals and birds is neither imaginary nor of slight importance. Experience with the English sparrow shows this clearly, but if further evidence is required it is only necessary to turn to Australia and New Zealand, which in a certain sense may be considered the experiment stations of the world in matters of acclimatization. Experiments have been made in these colonies for more than thirty years with a large number of species, and as a result it is possible to tell with great precision how certain birds and mammals are likely to behave in new surroundings. Two, at least, of the British colonies, profiting by these experiments, have taken steps to protect themselves from the evils of ill-advised acclimatization. Cape Colony in 1890 forbade the introduction of the Old World rabbit, and Western Australia, in 1893, passed her so-called "Destructive birds and animals act." Under this law the introduction of rabbits, flying foxes, English sparrows, starlings, blackbirds, and thrushes is prohibited, and additions to the list of proscribed species can be made at any time upon recommendation of the colonial bureau of agriculture. It would be folly for the United States to introduce other birds like the English sparrow, which are known to be injurious; and species that have proved injurious elsewhere should be prohibited from being brought into this country under penalties severe enough to discourage evasions of the law.

The losses which have resulted from the introduction of the rabbit, weasel, English sparrow, starling, and blackbird in New Zealand and the colonies of eastern Australia have amounted to millions of dollars. A similar fate no doubt awaits Hawaii and Porto Rico if indiscriminate acclimatization is permitted in these islands. Hawaii possesses several birds of peculiar interest which are now fast becoming extinct

through the work of the mongoose; and few of its native birds can exist with hardy species like the sparrow, mina, and starling.

In view of the immediate danger of the introduction of the mongoose and the desire now manifested to import several birds of doubtful value, I desire to renew the recommendation that the introduction of exotic mammals and birds be placed under the control of this Department. I respectfully recommend that Congress be asked to take prompt action to this end, and also to protect our island dependencies from further introduction of noxious species.

OUTLINE OF WORK FOR FISCAL YEAR ENDING JUNE 30, 1900.

Since the field work each season is necessarily planned and begun in the spring, the first few months of each new fiscal year are merely a continuation of the campaign approved during the preceding year. As already stated, explorations in Alaska and California are the most important features of the field work of 1899. The biological reconnoissance of the Pacific coast will be continued southward along the northern Coast Range region of California, and, if possible, to the southern part of that State. The topographic conditions in California are so complicated that this work must be carried on with great detail and unusual care exercised in working up the results. Consequently several years are necessary to cover an area, which, in a region uniform in character like the Great Plains or the Mississippi Valley, might be completed in a single season. Additional data will be collected for mapping the life zones in western Maryland in cooperation with the State geological survey of that State. As in past years, more or less field work will be required in small areas in different parts of the country, as the necessity for special data or further material is brought to light.

Sufficient material has now been collected to warrant undertaking an investigation of the food of flycatchers, swallows, and thrushes. In the case of the flycatchers, the proposed investigation promises interesting results. A preliminary report on the kingbird, issued in 1893, vindicated this species from the charge of doing appreciable harm in killing bees, and it is probable that the material now available will show more fully the value of the kingbird in destroying "robber flies." Little, if any, work has been done on the food of swallows. Stomach examinations will show the extent to which these birds are useful as insect destroyers. That they feed on insects is already known, but the kind of insects eaten and the benefit resulting from this destruction is now little more than conjecture.

Provision will be made, in accordance with your suggestion, to accommodate at least one student assistant in the laboratory, in case a properly qualified person is found. While the compensation of this assistant will be small, the opportunity for study and learning modern methods of work ought to attract graduates of agricultural colleges and others who desire to fit themselves for undertaking investigations in economic ornithology. Competent assistants for this branch of the office are difficult to obtain. The experiment of employing a few intelligent young men in subordinate positions and training them with a view of utilizing their services for a higher grade of work, in case they become proficient, may relieve the present difficulty, and seems well worthy of trial. With larger appropriations, two or three such assistants could be employed to advantage.

FUTURE WORK.

Reference has been made several times to lines of work which demand attention, such as cooperation with experiment stations and other agencies in conducting State biological surveys, defining more accurately the limits of life zones and their subdivisions, publication of larger and more detailed maps of life zones, and of maps showing the distribution of important mammals and birds. To enlarge on these matters would be mere repetition of what has already been said in previous reports.

For the present it is only possible to continue the investigations now under way. Further expansion or taking up new lines of work is practically out of the question until provided for by adequate appropriations. Cooperative work on State surveys is almost impossible, and demands for maps and certain publications can not be met with present resources. The point has been reached where the work can not be conducted with strict economy, for the reason that it has to be divided and carried over several fiscal years in order to come within the appropriations. Only last spring an important investigation was planned but finally deferred indefinitely for lack of sufficient funds. Such conditions neither permit economical management nor produce satisfactory results, and sometimes defer the publication of investigations so long as greatly to impair their value.

In the estimates for 1901, herewith submitted, an additional assistant at a salary of $1,500 has been asked for, to take charge of editorial and other routine work, and the recommendation for an increase of $5,000 in the lump fund for biological investigations has been renewed. These, with two or three minor changes, make a total increase of $6,940. I respectfully recommend that Congress be urged to provide this increased appropriation, which is almost indispensable for the successful continuance of the work.